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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/862,755	05/21/2001	Ye Li	1999-0759	8169

7590 01/10/2006

S. H. Dworetsky
AT&T Corp, Room 2A-207
One AT&T Way
Bedminster, NJ 07921

EXAMINER

FILE, ERIN M

ART UNIT	PAPER NUMBER
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2634

DATE MAILED: 01/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/862,755	Applicant(s) LI, YE	
	Examiner Erin M. File	Art Unit 2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 November 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17, 21-23, 27 and 28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-17, 21, 22 and 27 is/are rejected.
- 7) ☐ Claim(s) 23 and 28 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 May 2001 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-6 are rejected under 35 U.S.C. 102(e) as being anticipated by Okawa.

Claim 1, Okawa discloses eliminating cross-correlation between pilot symbols in transmission of data (abstract). The elimination of cross correlation means that the cross correlation is essentially zero. Okawa discloses that the one or more second sets of pilot symbols are based upon the first pilot signal by disclosing the same pilot symbols can be used in common (col. 6, lines 23, 24). Because a cross correlation can be made between transmitted pilot symbols, there must be at least two sets of pilot symbols being transmitted. Further Okawa does not disclose the use of matrix inversion for performing channel estimation.

Claim 2, Although Okawa does not use the term orthogonal frequency division multiplexing (OFDM), an OFDM carrier signal is the sum of a number of orthogonal sub-carriers, with baseband data on each sub-carrier being independently modulated (Wikipedia). Okawa discloses a sum of carriers (fig. 5, 14), which are independently modulated (fig. 5, 12) and spread (fig. 5, 13) with orthogonal spreading codes (col. 3, 21-27).

Claim 3, Okawa discloses eliminating cross-correlation between pilot symbols in transmission of data (abstract). The elimination of cross correlation means that the cross correlation is essentially zero.

Claim 4, Okawa discloses the cross correlation between pilot symbols inserted into channels is zero (abstract). From this it can be reasonably assumed that each cross-correlation estimate between every two sets of training symbols of the one or more sets of second training symbols is essentially zero.

Claims 5, 6, Okawa discloses that the pilot symbols are identical (col. 3, lines 21-22) and are shifted in their transmission position in uniform intervals (col. 8, lines 23-26).

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 7, 21, 22 rejected under 35 U.S.C. 102(b) as being anticipated by Lundby et al.

Claims 1, 7, 21, Lundby discloses a first transmit device that transmits a set of first training symbols (fig. 2, 4) and a second transmit device that transmits a set of second training symbols (fig. 2, 6, also see col. 4, lines 28-31). Further Lundby discloses that a common pilot signal is transmitted from the two separate transmitters 4 and 6, meeting the limitation of a second training sequence based upon the first training sequence (col/ 4, lines 28-30). Further Lundby states that the pilot channels are spread by Walsh sequences (col. 5, lines 32-33). Lundby further states that the cross-correlation of two orthogonal sequences is zero (col. 2, lines 36-38). Walsh sequences are orthogonal sequences, and therefore the pilot symbols spread by Walsh sequences are orthogonal. Further, Lundby does not disclose the use of matrix inversion for estimation purposes.

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Claim 22, further Lundby discloses the use of a common pilot symbol with transmit diversity (col. 4, lines 28-31), which will inherently introduce phase shift.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 10-16, 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okawa.

Claims 10, 27, although Okawa does not disclose the receiving one or more sets of second training symbols and characterizing two or more communication channels based on the set of first training symbols and the one or more second sets of training symbols wherein a cross-correlation estimate between the set of first training symbols and at least one of the sets of second training symbols is essentially zero. Okawa discloses the transmission of these first and second pilot symbols on first and second channels with a cross correlation of essentially zero (see Claim 1 paragraph 2 above), it

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can be reasonably inferred that the reception of transmitted signals would be obvious to one skilled in the art at the time of invention.

Claim 11, Okawa further discloses that the pilot symbols are transmitted using direct sequence code division multiple access (DS-CDMA), a type of orthogonal frequency division multiplexing (title).

Claim 12, Okawa discloses eliminating cross-correlation between pilot symbols in transmission of data (abstract). The elimination of cross correlation means that the cross correlation is essentially zero.

Claim 13, As Okawa discloses the cross correlation between pilot symbols inserted into channels is zero (abstract), it can be reasonably assumed that each cross-correlation estimate between every two sets of training symbols of the one or more sets of second training symbols is essentially zero.

Claims 14, 15, Okawa discloses that the pilot symbols are identical (col. 3, lines 21-22) and are shifted in their transmission position in uniform intervals (col. 8, lines 23-26).

Claim 16, Okawa does not disclose the use of matrix inversion in channel estimation.

7. Claims 8-10, 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lundby.

Claims 8, 10, 17, although Lundby does not disclose the receiving a set of first training symbols; receiving one or more sets of second training symbols; and characterizing two or more communication channels based on the set of first training symbols and the one or more second sets of training symbols; wherein a cross-correlation estimate between the set of first training symbols and at least one of the sets of second training symbols is essentially zero, as Lundby discloses the transmission of these first and second pilot symbols with a cross correlation of essentially zero, it can be reasonably inferred that the reception of these transmitted signals would be obvious to one skilled in the art at the time of invention.

Claim 9, further Okawa does not disclose characterizing the two or more communication channels using a matrix inversion.

Allowable Subject Matter

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8. Claims 23 and 28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

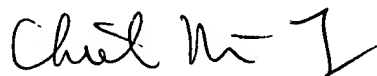
Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erin M. File whose telephone number is (571)272-6040. The examiner can normally be reached on M-F 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on (571)272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Erin M. File



CHIEH M. FAN
SUPERVISORY PATENT EXAMINER